

Life History, Habitat, and Taxonomic Characters of the Larva of *Mochlonyx fuliginosus*^{1,2}

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Cook (1956) describes three species of *Mochlonyx* in the Nearctic area: *Mochlonyx cinctipes* (Coquillett), *M. fuliginosus* (Felt) and *M. velutinus* (Ruthe). The adults are mosquito-like in appearance with short mouthparts. They are not known to bite, hence they and other members of the Chaoboridae have often been called non-biting mosquitoes. The larvae are predaceous to some degree upon mosquito larvae, as well as other aquatic life such as cladocerans, ostracods, copepods and protozoa. Investigations by O'Connor (1959) in Ohio on *M. cinctipes* and James (1957) in Ontario on *M. velutinus* indicated that larvae of these species were not very efficient in reducing the population of pest mosquito larvae in their respective study areas.

M. fuliginosus (Felt, 1905) was first described from a single female collected at Nassau, New York. The male was later described by Dyar and Shannon (1924). To date no detailed description of the larva or pupa has been published. *M. fuliginosus* is apparently very rare in collections but this may be due, in part, to the lack of information about the biology and habitat of the species. Available records of collections indicate the following distribution in North America: New Jersey, New York, Rhode Island, Massachusetts, Quebec and Ontario. The author's observations on this species were made in Passaic County, New Jersey and Bristol County, Massachusetts.

Habitat.—The collecting and observation site for this species in Passaic County, New Jersey was a cold, sphagnum bog, heavily shaded by hemlock (*Tsuga canadensis* (L.) Carr), white pine (*Pinus strobus* L.) and rhododendron (*Rhododendron maximum* L.). Many hummocks were present on which blueberry (*Vaccinium* sp.) and swamp laurel (*Kalmia polifolia* Wang.) predominated. In Massachusetts, blueberry swamps and white cedar (*Chamaecyparis thyoides* (L.) BSP.) swamps proved to be the preferred habitat. These swamps generally had a dense cover of sphagnum

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² Diptera, Chaoboridae. The present paper follows the usage by Stone (1956) of according family rank to the group of insects formerly limited to the subfamily Chaoborinae of the Culicidae.

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moss (*Sphagnum* spp.) and were interspersed with small hummocks. In one instance a pool produced by the overflow of a small stream and partly protected by a large rock, contained a number of larvae and pupae. This pool was shaded by a dense growth of Alder (*Alnus* sp.).

Life Cycle.—*Egg*: No eggs were seen or collected during these observations but it is probable, that the overwintering eggs, are oviposited in the leaf litter and debris of dry swamps and bogs similar to those of other *Mochlonyx* species (James, 1957, O'Connor, 1959).

Larva: During May and June, *M. fuliginosus* larvae are often associated with *M. cinctipes* and *M. velutinus* but unlike these two species it is multivoltine, a number of generations being present throughout the summer and fall. In the two areas studied *Mochlonyx* larvae collected after the middle of June were almost certain to be *M. fuliginosus*. Larvae have been collected in all months from May to December. Earliest collections were made on May 23 and the latest on December 1.

The greatest number of larvae and pupae were collected in dark protected holes under hummocks present in the bog or swamp habitat. *Culiseta melanura* (Coquillett) also prefers such an environment and was present in many of the *M. fuliginosus* collections. In the laboratory *M. fuliginosus* larvae readily feed on *C. melanura* larvae and undoubtedly, in nature, first and second instar *C. melanura* larvae are consumed. Cannibalism was noted on one occasion with specimens confined in a small jar.

In addition to *C. melanura* larvae, other mosquito larvae found associated with *M. fuliginosus* were *Culex territans* Walker, *Aedes c. canadensis* (Theobald) and *Culiseta morsitans dyari* (Coquillett).

Pupa: The pupa, unlike pupae of the closely related Culicidae, remains below the water surface until eclosion is imminent. The length of pupal period in specimens reared in the laboratory was three or four days.

Adult: Adults were observed adjacent to the breeding holes. They were often flushed from dark recesses under roots and stones in close proximity to the emergence sites. On one occasion, viz. December 1, 1955 in Passaic County, New Jersey, a female was observed emerging from a pupa at the water's surface. The temperature of the water at this time was close to the freezing point.

Taxonomic Notes.—Edwards (1930) first synonymized *M. martinii* with the species Martini (1929) described as *M. velutinus* (Ruthe) and stated his reasons as follows: "I consider that a new name should be given to the species described by Martini as *M. velutinus* because Ruthe's description appears to fit the common *M. culiciformis* better and because the British Museum possesses German specimens named by Ruthe himself which are certainly *M. culiciformis*." Cook (1956) suggested that the

European *M. martinii* (Edwards) was possibly synonymous with *M. fuliginosus* (Felt). Freeman (1962) confirmed this claim by examination of British and Finnish material of *M. martinii* and by comparing adults with figures and descriptions of American specimens and stated "*M. fuliginosus* now has a Holarctic distribution." The author has also examined larvae and pupae labeled *M. martinii* from Abisko, Sweden in the British Museum collection and found that these stages agree very closely with American specimens of *M. fuliginosus* and descriptions and figures of Martini (1929) and further substantiates the synonymy.

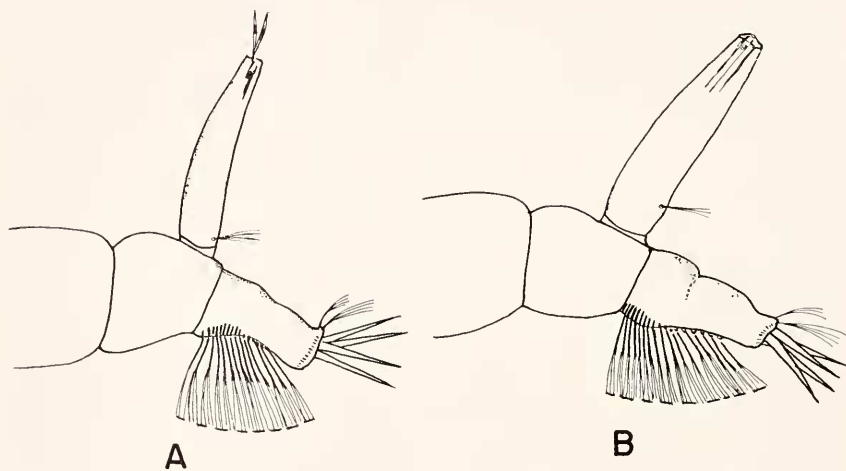


FIG. 1. Terminal segments of larvae of *Mochlonyx*: A. *Mochlonyx fuliginosus* showing paired structures at distal end of siphon. B. *Mochlonyx cinctipes*.

Description of Larva: Martini (1929) provides a very brief description and figures the head and its appendages as well as the end of the siphon of *M. velutinus* (= *M. fuliginosus*). He states that the breathing tube has a pair of feathered hairs at the end. Specimens of *M. fuliginosus* examined by the author had paired structures at the distal end of the siphon but these were solid in character and never appeared as feathered hairs. Third and fourth instar larvae of *M. fuliginosus* can be separated readily from *M. cinctipes* and *M. velutinus* by the shape of the siphon and the presence of the paired structures at the distal end of the siphon (Fig. 1). The second instar of *M. fuliginosus* can also be separated from these other species by the paired structures at the end of the siphon, but the siphon is shorter and stouter similar to *M. cinctipes* and *M. velutinus* and is not a good separating diagnostic character in this stage.

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The Entomologist's Record

To encourage the publication of concise and useful new distribution records, corrections of previously published erroneous records, misidentifications, short field notes, and current news items about entomologists, amateur and professional, entomology departments and museums, prompt (monthly) publication is offered in this department.

The Salt Marsh Habitat: A special project of the Pacific Coast Entomological Society, was begun at a meeting in 1967 following a lecture on the ecology of the mud flat-salt marsh habitat. A number of the members expressed concern regarding the rapid disappearance of this habitat due to commercial development. Subsequently, a salt marsh habitat committee was appointed to stimulate studies in central California. The Society is now sponsoring publication of notes and observations on salt marsh insects (and other terrestrial arthropods) for publications in the Pan-Pacific Entomologist. Articles should be submitted to the editor of the Journal, California Academy of Sciences, San Francisco, California 94118. An annotated bibliography of California species of salt marsh insects will appear in Volume 44, No. 4, 1968. It is our hope that entomological societies in other geographic locations will undertake a similar interest and sponsorship of articles on the salt marsh habitat.—JOEL F. GUSTAFSON, Professor of Ecology and Systematics, San Francisco State College, Chairman, Salt Marsh Habitat Committee, Pacific Coast Entomological Society.

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